

$$\forall x \{ G(x) \leftrightarrow \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \}$$

$$\forall x \{ \{ G(x) \Rightarrow \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \} \wedge$$

$$\{ \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \Rightarrow G(x) \} \}$$

El.  $\Leftrightarrow$

El.  $\Rightarrow$

$$\forall x \{ \{ \neg G(x) \vee \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \} \wedge$$

$$\{ \neg \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \vee G(x) \} \}$$

Move  $\neg$  in

$$\forall x \{ \{ \neg G(x) \vee \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \} \wedge$$

$$\{ \{ \neg B(x) \wedge \neg \exists y \{ D(x, y) \wedge H(y) \} \} \vee G(x) \} \}$$

$$\forall x \{ \{ \neg G(x) \vee \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \} \wedge$$

$$\{ \{ \neg B(x) \wedge \forall y \{ \neg D(x, y) \vee \neg H(y) \} \} \vee G(x) \} \}$$

Std. var.

$$\forall x \{ \{ \neg G(x) \vee \{ B(x) \vee \exists y \{ D(x, y) \wedge H(y) \} \} \} \wedge$$

$$\{ \{ \neg B(x) \wedge \forall z \{ \neg D(x, z) \vee \neg H(z) \} \} \vee G(x) \} \}$$

Skolemize

$$\forall x \{ \{ \neg G(x) \vee \{ B(x) \vee \{ D(x, F(x)) \wedge H(F(x)) \} \} \} \wedge$$

$$\{ \{ \neg B(x) \wedge \forall z \{ \neg D(x, z) \vee \neg H(z) \} \} \vee G(x) \} \}$$

Drop univ. quant.

$$\{ \neg G(x) \vee \{ B(x) \vee \{ D(x, F(x)) \wedge H(F(x)) \} \} \} \wedge$$

$$\{ \{ \neg B(x) \wedge \{ \neg D(x, z) \vee \neg H(z) \} \} \vee G(x) \} \}$$



$$\{ \neg G(x) \vee \{ \{ B(x) \vee D(x, F(x)) \} \wedge \{ B(x) \vee H(F(x)) \} \} \wedge \{ \{ G(x) \vee \neg B(x) \} \wedge \{ G(x) \vee \{ \neg D(x, z) \vee \neg H(z) \} \} \}$$

$$\{ \{ \neg G(x) \vee \{ B(x) \vee D(x, F(x)) \} \} \wedge \{ \neg G(x) \vee \{ B(x) \vee H(F(x)) \} \} \} \wedge \{ G(x) \vee \neg B(x) \} \wedge \{ G(x) \vee \neg D(x, z) \vee \neg H(z) \}$$


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$$\begin{array}{l} \text{CNF} \\ \{ \neg G(x) \vee B(x) \vee D(x, F(x)) \} \wedge \{ \neg G(x) \vee B(x) \vee H(F(x)) \} \wedge \\ \{ G(x) \vee \neg B(x) \} \wedge \{ G(x) \vee \neg D(x, z) \vee \neg H(z) \} \end{array}$$


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With  $\theta = \{x/\text{Linn}, z/\text{Prius}\}$  and assuming  $G(\text{Linn}) = 0$ , the last clause would be  $\{ \text{False} \vee \neg D(\text{Linn}, \text{Prius}) \vee \neg H(\text{Prius}) \}$  which goes against the given KB. Thus

KB  $\models \text{Green}(\text{Linn})$